# Finite-time stability and stabilization of stochastic nonlinear systems

**Feb. 25, Monday 2013, 10:00-11:00, Room 405, Siyuan Building**

**Abstract:**

Suiyang wish to take this precious opportunity to share with you his and his co-workers' work on finite-time stability and stabilization of stochastic nonlinear systems (SNSs). First of all, we will go through the definition of finite-time stability for SNSs. This definition involves stability in probability and finite-time attractiveness in probability. We will briefly go through the existing Lyapunov theorem on asymptotic stability, the existence and uniqueness of solutions for SNSs, and then finally, our proposed Lyapunov theorem on finite-time stability for SNSs. After the introduction of finite-time stability theory, we will investigate the problem of almost surely finite-time stabilization of a class of stochastic nonlinear systems. It would be shown that right-uniqueness of solution is introduced and added to the previous definition of finite-time stability to ensure that, after the first hitting time, the solution can remain at zero thereafter. The control design will be discussed, which is motivated by the back-stepping and adding an integrator approach. The Lemma on existence of solution will be introduced, which requires only the negative definiteness of the differential operator of the Lyapunov function and continuity of control and system states. Also, it will be shown that our control design ensure right-uniqueness of solution of the closed-loop SNSs. To conclude the sharing, simulation results will be given to illustrate the theoretical analysis.

**Bio:**

**Suiyang Khoo** received the B.Eng. degree in electronics and communications engineering from Tasmania University and the Ph.D. degree in computer engineering from Nanyang Technological University, in 2005 and 2008, respectively. In 2008, he was a Research Fellow in the Department of Electrical and Electronics Engineering, Nanyang Technological University, Singapore. Since 2009, he has been with the School of Engineering, Deakin University, Victoria, Australia, where he is now Lecturer in Electronics Engineering. His research interests include stochastic control, variable structure control, co-operative control, robotics, adaptive signal processing, and time-varying system.